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Acoustic waves in multifractional bubbly liquids

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Abstract

© 2015, Pleiades Publishing, Ltd. The propagation of acoustic waves in multifractional mixtures of a liquid with vapor-gas and gas bubbles of different sizes and different compositions with phase transitions is investigated. The dispersed phase consists of N + M fractions having various gases in bubbles and different in the bubble radii. Phase transitions accounted for N fractions. The total bubble volume concentration is small (less than 1%). A system of differential equations of the mixture motion is developed, and the dispersion relation is derived. It is shown that the dispersion and dissipation of acoustic waves depends largely on the presence of bubbles of various proportions in the composition of the disperse phase. It is found that the replacement of a fraction of vaporgas bubbles in the monodisperse bubbly mixture with phase transitions for gas bubbles with different thermophysical properties, depending on the type of gas, can lead to both a decrease and an increase in the attenuation coefficient in the low-frequency region.

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